

METHOD 7090

BERYLLIUM (ATOMIC ABSORPTION, DIRECT ASPIRATION)

1.0 SCOPE AND APPLICATION

1.1 See Section 1.0 of Method 7000.

2.0 SUMMARY OF METHOD

2.1 See Section 2.0 of Method 7000.

3.0 INTERFERENCES

3.1 See Section 3.0 of Method 7000 if interferences are suspected.

3.2 Background correction may be required because nonspecific absorption and light scattering can be significant at the analytical wavelength.

3.3 Concentrations of aluminum greater than 500 ppm may suppress beryllium absorbance. The addition of 0.1% fluoride has been found effective in eliminating this interference. High concentrations of magnesium and silicon cause similar problems and require the use of the method of standard additions.

4.0 APPARATUS AND MATERIALS

4.1 For basic apparatus, see Section 4.0 of Method 7000.

4.2 Instrument parameters (general):

4.2.1 Beryllium hollow cathode lamp.

4.2.2 Wavelength: 234.9 nm.

4.2.3 Fuel: Acetylene.

4.2.4 Oxidant: Nitrous oxide.

4.2.5 Type of flame: Fuel rich.

4.2.6 Background correction: Required.

5.0 REAGENTS

5.1 See Section 5.0 of Method 7000.

5.2 Preparation of standards:

5.2.1 **Stock solution:** Dissolve 11.6586 g beryllium sulfate, BeSO_4 , in Type II water containing 2 mL nitric acid and dilute to 1 liter.

Beryllium metal can also be dissolved in H_2SO_4 . Alternatively, procure a certified standard from a supplier and verify by comparison with a second standard.

5.2.2 Prepare dilutions of the stock solution to be used as calibration standards at the time of analysis. The calibration standards should be prepared using the same type of acid and at the same concentration as will result in the sample to be analyzed after processing (0.5% v/v HNO_3).

6.0 SAMPLE COLLECTION, PRESERVATION, AND HANDLING

6.1 See Chapter Three, Section 3.1.3, Sample Handling and Preservation.

7.0 PROCEDURE

7.1 Sample Preparation: The procedures for preparation of the sample are given in Chapter Three, Section 3.2.

7.2 See Method 7000, Paragraph 7.2, Direct Aspiration.

8.0 QUALITY CONTROL

8.1 See Section 8.0 of Method 7000.

9.0 METHOD PERFORMANCE

9.1 The performance characteristics for an aqueous sample free of interferences are:

Optimum concentration range: 0.05-2 mg/L with a wavelength of 234.9 nm.

Sensitivity: 0.025 mg/L.

Detection limit: 0.005 mg/L.

9.2 In a single laboratory, analysis of a mixed industrial-domestic waste effluent, digested with Method 3010, at concentrations of 0.01 and 0.25 mg/L gave standard deviations of ± 0.001 and ± 0.002 , respectively. Recoveries at these levels were 100% and 97%, respectively.

9.3 For concentrations of beryllium below 0.02 mg/L, the furnace procedure (Method 7091) is recommended.

10.0 REFERENCES

1. Methods for Chemical Analysis of Water and Wastes, EPA-600/4-82-055, December 1982, Method 210.1.

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